

Remarks

I. Introduction

This is in response to the Office Action dated June 9, 2005. The Office Action rejected claims 1-5, 7, 8, 23, and 30 under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 5,909,540 (Carter). Claims 6, 9-17, and 26 were rejected under 35 U.S.C. §103(a) as being unpatentable over Carter in view of U.S. Patent No. 6,823,377 (Wu). Claims 18-22 were rejected under 35 U.S.C. §103(a) as being unpatentable over Carter in view of U.S. Patent No. 5,909,540 (Kuroki). Claims 24-25 were rejected under 35 U.S.C. §103(a) as being unpatentable over Carter. Claims 27-29 were rejected under 35 U.S.C. §103(a) as being unpatentable over Carter in view of Wu and further in view of Kuroki.

In response, Applicant has amended claims 1, 9, 12, 15, 18, 23, 25, 26-28, and 30. Applicant has canceled claims 6 and 24. Claims 1-5, 7-23, and 25-30 remain for consideration.

II. Rejections under 35 U.S.C. §102

Claims 1-5, 7, 8, 23, and 30 were rejected under 35 U.S.C. §102(e) as being anticipated by Carter. In order for a claim to be anticipated under 35 U.S.C. §102, **each and every** limitation of the claim must be found either expressly or inherently in a single prior art reference. PIN/NIP, Inc. v. Platte Chem. Co., 304 F.3d 1235, 1243 (Fed. Cir. 2002). In the present case, Carter does not show each and every limitation of claims 1-5, 7, 8, 23, and 30. Therefore, Applicant requests the withdrawal of the rejection under 35 U.S.C. §102(e).

The present invention is generally directed to creating or maintaining data objects in a network or networks. The data objects are mirrored at a minimum number of sites designated "n" with each site separated by a minimum distance. In the event of a disaster and loss of a data object, there may be at least n-1 copies of the data object remaining at various sites in the network. The data object may be copied to storage locations in proximity to requesting sites resulting in an increased number of copies of the data object. Less often or less

recently accessed copies of the data object may be subsequently removed to return the number of copies to "n". Data may also be lost, thus reducing the number of copies to below "n". New copies are created and re-inserted into the network to maintain the minimum number of copies of the data object in the network separated by at least a distance of d.

Carter is directed to data storage systems for continuing operation after a node failure in a system for providing distributed control over data. A number of nodes are interconnected by a network and the nodes periodically exchange connectivity information. (Col. 3, lines 29-33). The network system includes the nodes and an addressable shared memory space for storing a structured store of data. (Col. 5, lines 20-25). The addressable shared memory space can be assigned or mapped to one or more hard disk drives that are on the network. (Col. 7, lines 2-5). Each node can include sub-elements such as a data control program. Further, the system may store copies of pages of data on pages or multiple nodes. "The nodes responsible for a range of addresses will be referred to as the "core holders" of those pages. Each page can be assigned a minimum number of core holders below which it should not fall." (Col. 26, lines 3-7).

Amended claim 1 has the limitation of:

a data manager for storing a copy of said data object in one of said storage locations and for transferring said data object to a storage location within a predetermined distance of said requesting node....

Carter does not show this limitation because Carter does not include a data manager that transfers a data object to a storage location **within a predetermined distance of a requesting node**. The Office Action admits that Carter does not disclose "transferring the data object to a storage location within a predetermined distance of said site." (Page 6). Therefore, independent claim 1 is allowable over Carter.

Amended, independent claim 23 contains the limitation of:

broadcasting a deletion message to said plurality of storage locations via a multicast protocol....

Carter discloses a directory structure that provides location information for pages stored in the distributed address space. The directory structure continually subdivides the memory space into smaller and smaller sections. Each section is represented by directory pages of the same structure, but indexes address spaces of different sizes. As pages are created or deleted, a linker inserts or deletes the pages from the directory.

Carter does not, however, disclose broadcasting a deletion message to storage locations in order to delete the data object at each determined storage location. Carter discloses a linker deleting pages from a directory structure but does not disclose a broadcasting message. Although the Office Action states that this limitation is well known in the art, Applicant respectfully disagrees. One skilled in the art would have no reason to use a broadcasting message in Carter because Carter specifically discloses a linker inserting or deleting pages from the directory. Therefore, independent claim 23 is allowable over Carter.

Independent claim 30 contains the limitation of:

a node distance table for storing distance information between nodes....

Carter discloses that data may have no physical home but rather can migrate between memory devices of the network. Carter has a directory page generator that has a node selector for generating a responsible node signal representative of a select one of computers having location information for a portion of the shared address space. Carter's stored location information, however, is not **distance information between nodes**. Instead, Carter's location information is the location of a portion of shared address space storing data. Carter does not disclose maintaining distance information between nodes.

The Office Action states that Carter discloses the above limitation at col. 10, line 36 – col. 11, line 21 and at col. 19, lines 21-35. These sections describe directory entry scanning and location information for a portion of the shared address space. As described above, however, Carter does not disclose distance information between nodes.

For the reasons discussed above, independent claims 1, 23, and 30 are allowable over the cited art. Allowance of these independent claims is requested. The claims dependent upon independent claims 1, 23 and 30 are dependent upon an allowable independent claim and are therefore also allowable. In addition, the dependent claims add additional patentable subject matter and are also allowable for the reasons discussed below.

Dependent claims 2-4 relate to storage locations in the network possessing at least one attribute (e.g., a geographic location) and configured to determine a function based on said attribute (e.g. a distance between said storage locations in the network). Carter does not disclose storage locations possessing at least one attribute and configured to determine a function based on the attribute. Carter discloses that each page can be assigned a minimum number of core holders. Carter does not, however, disclose the core holders having attributes such as geographic location or being configured to determine a function based on the attribute, such as determining a distance between the core holders in the network. Therefore, dependent claims 2-4 are allowable over Carter.

III. Rejections under 35 U.S.C. §103

Claims 6, 9-17, and 26 were rejected under 35 U.S.C. §103(a) as being unpatentable over Carter in view of Wu. Claims 18-22 were rejected under 35 U.S.C. §103(a) as being unpatentable over Carter in view of Kuroki. Claims 24-25 were rejected under 35 U.S.C. §103(a) as being unpatentable over Carter. Claims 27-29 were rejected under 35 U.S.C. §103(a) as being unpatentable over Carter in view of Wu and further in view of Kuroki. None of the cited references, either alone or in combination, disclose Applicant's invention.

Wu is directed to the caching of web objects on network proxy servers located between client machines and content servers. A request is first hashed into an anchor hash partition. Each hash partition is mapped to one of the geographically distributed proxies. Secondly, a selection algorithm is used to pick a proxy among a small number of hash partitions adjacent to the anchor

hash partition. The selection is based on an objective to reduce network latency and to avoid creating overloaded proxies. (Col. 2, lines 45-55).

Kuroki is directed to a gateway apparatus for Simple Network Management Protocol (SNMP) / Open Systems Interconnection (OSI) management. Kuroki discloses a gateway apparatus having SNMP protocol process means, OSI protocol process means, table means for determining a correspondence between a definition of a management information of SNMP management, and conversion means for converting a management operation and the management information. (Col. 8, lines 19-27).

Amended, independent claim 9 claims the limitations of:

selecting at least one storage location based on the minimum distance....

Amended, independent claim 12 claims the limitation of:

wherein the selected storage location is separated by at least a distance d from at least one other storage location in the network containing a copy of the data object, d being a predetermined minimum distance.

Claim 9 is directed to managing a data object by determining a minimum distance between storage locations, selecting one or more storage locations based on this minimum distance, and storing a copy of the data object at the selected location. Claim 12 is directed to determining the actual number of storage locations containing a copy of the data object, determining a minimum number of copies of the data object, and storing a copy of the data object at a selected storage location if the actual number of storage locations containing a copy of the data object is less than the desired minimum number. Claim 12 further claims that this occurs when the selected storage location is separated by at least a distance d from at least one other storage location in the network containing a copy of the data object. The Office Action admits that Carter does not disclose selecting at least one storage location based on the minimum distance between storage locations. The Office Action relies on Wu to cure the deficiencies of Carter.

Wu does not cure the deficiencies of Carter. Wu is directed to the caching of web objects on network proxy servers located between client machines and content servers. Wu hashes requests into geographically distributed proxy caches. (Abstract). Wu does not, however, disclose managing a data object in a network or data mirroring. Wu does not specifically disclose selecting a storage location based on a minimum distance between storage locations. Wu instead only discloses a distance with respect to which proxy cache to use with respect to a plurality of proxy caches located between client machines and content servers.

The Office Action states that Wu discloses “a system for distributed data storage with means for selecting at least one storage location based on the minimum distance” in col. 3, lines 50-57 and col. 7, lines 16-23. Col. 3, lines 50-57 disclose a proxy cache and client requests being first sent to the proxy cache. If requested objects are found on the proxy caches, the objects are returned to the client machines from the proxy caches. Col. 7, lines 16-23 disclose a selection module selecting a candidate proxy cache if “the latency delay can be improved if the request were to hash into it.” Thus, Wu discloses selecting a proxy cache if the latency delay can be improved by the selection. Wu does not disclose selecting at least one storage location based on a **minimum distance between a plurality of storage locations**. Thus, amended, independent claims 9 and 12 are allowable over Carter in view of Wu.

Amended, independent claims 15 and 26 contain limitations similar to claims 9 and 12 and are allowable for the reasons discussed above in conjunction with claims 9 and 12.

Amended, independent claim 18 claims the limitation of:

deleting a copy of the data object from a storage location if the actual number is greater than the maximum number of copies of the data object.

The Office Action admits that Carter does not disclose the above limitation. The Office Action relies on Kuroki to cure the deficiencies of Carter.

Kuroki does not cure the deficiencies of Carter. Kuroki is related to providing a gateway apparatus for SNMP/OSI management. Unlike Applicant's invention, which is focused on ensuring data survivability by dynamically replicating information at a number of sites and maintaining at least a predetermined minimum number of mirror sites containing the information, Kuroki is instead directed to managing an OSI management agent by an SNMP manager by converting the management operation and the management information. (Col. 5, lines 11-15). Therefore, there is no motivation to combine Kuroki with Carter.

For the reasons discussed above, independent claims 9, 12, 15, 18, and 26 are allowable over the cited art. Allowance of these independent claims is requested. The remaining claims are dependent upon an allowable independent claim and are therefore also allowable. In addition, the dependent claims add additional patentable subject matter and are also allowable for the reasons discussed below.

Dependent claims 13 and 16 contain the limitation of calculating the predetermined minimum distance d . The Office Action admits that Carter does not disclose this limitation and relies on Wu to cure the deficiencies of Carter. Wu, however, does not cure the deficiencies of Carter because Wu is, as described above, directed to the caching of web objects on network proxy servers located between client machines and content servers. Wu does not, however, disclose managing a data object in a network or data mirroring. Wu does not specifically disclose calculating a predetermined distance d separating the storage locations containing the data object. Therefore, dependent claims 13 and 16 are allowable.

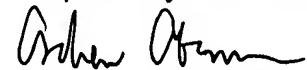
Dependent claim 20 contains the limitation of determining an attribute of each storage location containing a copy of the data object. Carter does not disclose an attribute of each storage location containing a copy of the data object. The Office Action states that Carter discloses this limitation in col. 25, line 61 – col. 26, line 15. In col. 25, line 61 through col. 26, line 15, Carter discloses

a core holder but does not disclose determining an attribute of each core holder. Therefore, dependent claim 20 is allowable.

IV. Conclusion

For the reasons discussed above, all pending claims are allowable over the cited art. Reconsideration and allowance of all claims is respectfully requested.

Respectfully submitted,



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